



Chapter

**4**

**FORECASTS OF AVIATION  
ACTIVITY**

---

## **FORECASTS OF AVIATION ACTIVITY**

*for the Airport Master Plan  
at Grand Canyon West Airport*

---

### **4.0 INTRODUCTION**

Forecasts of aviation activity serve as a guideline for the timing required for implementation of airport improvement programs. While such information is essential to successful comprehensive airport planning, it is important to recognize that forecasts are only approximations of future activity, based upon historical data and viewed through present situations. They therefore must be used with careful consideration, as they may lose their validity through the passage of time.

For this reason, an ongoing program of examination of local airport needs, as well as national and regional trends, is recommended and encouraged in order to promote the orderly development of the Grand Canyon West Airport.

At airports which are not served by air traffic control towers, estimates of existing aviation activity are necessary in order to form a basis for the development of realistic forecast projections. These estimates are based upon a review of available historical data, as well as contacts with airport users.

Following the development of the estimated current demand, projections are made based upon established growth rates, area demographics, industry trends and other important indicators. Forecasts are prepared for the Initial Term (1997-2001), the Intermediate Term (2002-2006) and the Ultimate Term (2007-2016) time frames. Having forecasts within these time frames will allow the construction of airport improvements to be timed to meet demand, but not so early as to remain idle for an unreasonable length of time.

---

## 4.1 TYPES OF AIRCRAFT OPERATIONS

There are four types of aircraft operations which are considered in the planning process. These are termed local, based, itinerant, and transient. They are defined as follows:

- **Local operations** are defined as aircraft movements (departures or arrivals) for the purpose of training, pilot currency or pleasure flying, within the immediate area of the local airport. These operations typically consist of touch-and-go operations, practice instrument approaches, flights to and within local practice areas, and pleasure flights which originate and terminate at the airport under study.
- **Itinerant operations** are defined as arrivals and departures other than local operations, as described above. This type of operation is closely tied to local demographic indicators, such as local industry and business use of aircraft and usage of the facility for recreational purposes.
- **Based aircraft operations** are defined as the total operations made by aircraft based at the airport under study, with no attempt to classify the operations as to purpose.
- **Transient operations** are defined as the total operations made by aircraft other than those based at the airport under study. These operations typically consist of business or pleasure flights originating at other airports, with termination or a stopover at the study airport.

The terms transient and itinerant are sometimes erroneously used interchangeably. This study will confine analysis to local versus itinerant.

## 4.2 AVAILABLE ACTIVITY FORECASTS

The establishment of an accurate basis for the forecasting of future aviation activity is of primary importance in any planning effort. The recommended practice is to begin with the examination of prior estimates and forecast figures.

In an attempt to arrive at a reasonable estimate of current usage of the Grand Canyon West Airport and to facilitate development of accurate forecast estimates, a review of available data was made. The data sources examined included the following:

- <sup>1</sup> Grand Canyon West Master Plan, Cornoyer-Hedrick, Inc., June 6, 1994.
- <sup>2</sup> Airport User's Survey Responses, Armstrong Consultants, Inc., December 1996.

Air traffic and visitor counts were performed by ReSovle Inc., and used by Cornoyer-Hedrick, Inc. in the preparation of a master plan for a proposed resort complex at the Grand Canyon West location. The traffic and visitor counts were compared to financial records and were found to be reasonably accurate. Responses on airport user's surveys received from air tour operators servicing Grand Canyon West provided additional estimates of historical and forecasted operations.

Operations data for Grand Canyon West Airport was not available from the National Plan of Integrated Airport Systems (NPIAS), the Arizona Aviation System Plan (AASP), or the Arizona State Aviation Needs Study.

There is currently no scheduled commercial service to the Grand Canyon West Airport; however, non-scheduled air taxi and charter service is highly utilized.

#### **4.3 FAA RECORDS OF AVIATION ACTIVITY**

The FAA Form 5010 is the official master record kept by the Federal Aviation Administration to document airport physical conditions and other pertinent information. The record normally includes an annual estimate of aircraft activity as well as the number of based aircraft; however, Grand Canyon West Airport was a private airport until November 1996. Therefore, an official FAA inspection has not been accomplished and data for based aircraft and operations was not listed on the FAA Form 5010. The master record will be updated to reflect the operations identified in this report until an inspection by the FAA can be accomplished.

#### **4.4 AIRPORT TRAFFIC MIX DETERMINATION**

There are currently no based aircraft at Grand Canyon West Airport. All operations at the airport are transient with a high percentage of the flights originating in the Las Vegas area.

Because of the poor condition of the runway surface virtually all aircraft operations are limited to single engine piston aircraft and helicopters. Responses from the airport user's survey and interviews with airport management were used to verify the aircraft types using the airport and to determine relative fleet mix of aircraft that may utilize the Grand Canyon West Airport in the future. The current fleet mix is listed in Table IV-1. Discussion of the future fleet mix at Grand Canyon West Airport is included in Section 4.6 Development of Aviation Forecasts.

**TABLE IV-1  
CURRENT AIRCRAFT FLEET MIX  
GRAND CANYON WEST AIRPORT**

| <b>Single<br/>Engine</b> | <b>ME<br/>Piston</b> | <b>Turbo<br/>Prop</b> | <b>GA Jet</b> | <b>Rotor-craft</b> | <b>Other</b> |
|--------------------------|----------------------|-----------------------|---------------|--------------------|--------------|
| >99%                     | 0%                   | <1%                   | 0%            | <1%                | 0%           |

As improvements are made to the Grand Canyon West Airport, it is expected that operations will tend towards larger capacity aircraft capable of carrying 10 to 19 passengers, 20 to 49 passengers, and 50 to 100 passengers. The relative percentage of single engine piston aircraft will decrease, resulting in higher percentages of multi-engine turboprop aircraft, business jet aircraft, and potentially short-haul commercial aircraft capable of carrying more than 100 passengers. In turn, passenger forecasts

---

tend to increase and forecasts of aircraft operations tend to level out. This will be discussed further in Section 4.6 Development of Aviation Forecasts.

#### 4.5 DETERMINATION OF EXISTING ACTIVITY LEVEL

In order to determine the existing level of activity at the Grand Canyon West Airport, the data presented above was integrated as follows:

- Visitor counts reported by Cornoyer-Hedrick, Inc. were used to determine total annual enplanements at the airport for the base year 1994.
- The total annual enplanements were divided by the average number of passengers enplaned per departure (average number of seats available in the aircraft servicing Grand Canyon West multiplied by a load factor of 85%) to derive the number of annual departures. This number was doubled to arrive at the number of total annual operations.

|                                   |        |
|-----------------------------------|--------|
| Average Seats available/Departure | 5      |
| Load Factor                       | .85    |
| Enplanements/Departure            | 4.25   |
| Total Annual Enplanements (1994)  | 44,053 |
| Annual Departures                 | 10,365 |
| Annual Operations                 | 20,730 |

- The total annual operations were then multiplied by the fleet mix percentages obtained from the airport user survey responses to determine the number of annual operations per aircraft type.
- Although most of the operations included sightseeing tours over the Grand Canyon, these tours were conducted enroute to the airport from the pick up location or from the airport enroute to the drop off location and are considered itinerant. Should tour operators decide to base aircraft at Grand Canyon West Airport in the future, then tours conducted over the Canyon would be considered local, as they would originate and terminate at the Grand Canyon West airport.

The estimated level of existing aircraft activity for the base year of this study (1994) is presented in Table IV-2.

**TABLE IV-2**  
**EXISTING AIRCRAFT ACTIVITY LEVELS**  
**GRAND CANYON WEST AIRPORT**  
**BASE YEAR 1994**

| <b>Aircraft Type</b>   | <b>Fleet Mix %</b> | <b>Operations<br/>(100% Itinerant)</b> |
|------------------------|--------------------|--|
| Single Engine          | >99%               | 20,636                                 |
| Multi-Engine Piston    | <0%                | 0                                      |
| Multi-Engine Turboprop | <1%                | 34                                     |
| Jet                    | 0%                 | 0                                      |
| Rotorcraft             | <1%                | 60                                     |
| <b>TOTAL 1994</b>      | <b>100%</b>        | <b>20,730</b>                          |

## **4.6 DEVELOPMENT OF AVIATION FORECASTS**

The procedure utilized to forecast aviation activity at Grand Canyon West considers the relationship between current aviation activity, tourist demand, and infrastructure development at the airport to support aircraft and passenger flows.

The forecasts of annual enplanements were derived through the qualitative and quantitative analysis of the historical enplanement trends at Grand Canyon West Airport. Existing forecasts, market share trends, and regression analysis results were studied to arrive at the preferred enplanements forecasts depicted in Figure 4-1.

Once forecasts of annual enplanements were established, the same procedure used in Section 4.5 was used to arrive at the forecasted number of annual operations.

### **4.6.1 Forecasts of Annual Enplanements**

#### *Existing Forecasts*

The forecasts presented in the Grand Canyon West (Resort) Master Plan estimate a 25% annual increase in Grand Canyon West visitors arriving by air through the year 2000. These forecasts were based on traffic counts in 1991 and 1992 and the projected infrastructure developments at the Grand Canyon West site.

#### *Market Share Analysis*

Forecasts were developed based on an analysis of the historical market share of enplanements at Grand Canyon West Airport as a percentage of total U.S. domestic enplanements and as a percentage of total enplanements in the FAA Western Pacific Region. The percentage of enplanements at Grand Canyon West Airport as compared to the U.S. Domestic market for 1992, 1993, and

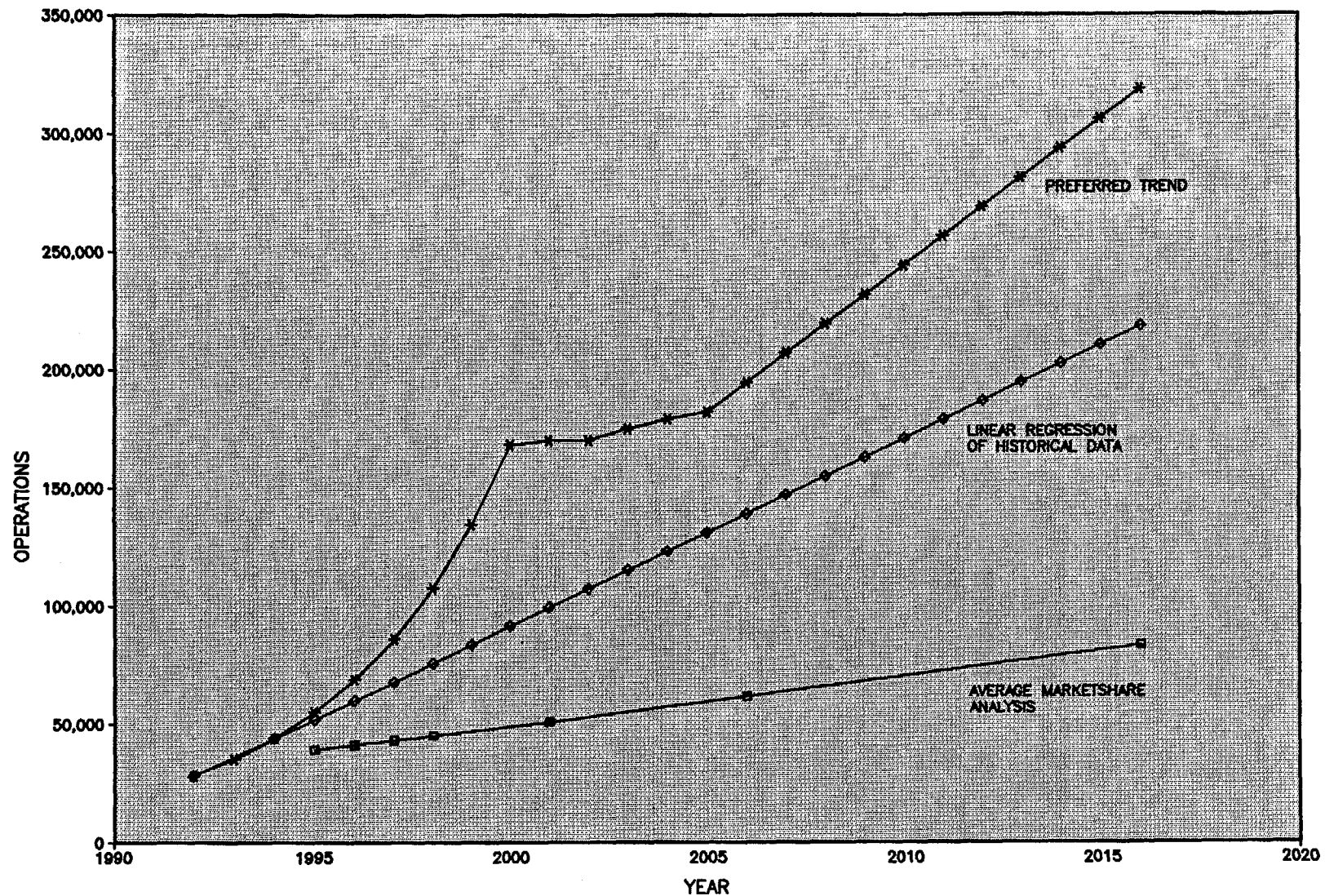


FIGURE 4-1  
GRAND CANYON WEST AIRPORT  
FORECAST OF ANNUAL ENPLANEMENTS

---

1994 was averaged, then applied to the forecasted enplanements for the US Domestic market found in the FAA Terminal Forecasts report. This resulted in a steady, but relatively slow growth trend. The procedure was repeated for the Western Pacific Region market and resulting in a similar growth trend. These results are less than the anticipated growth at the Grand Canyon West Airport.

#### *Preferred Forecasts*

The forecast of annual enplanements developed by Armstrong Consultants in Figure 4-1 incorporates the growth patterns indicated in visitor counts, increased operations indicated in airport user's survey responses, and planned improvements for Grand Canyon West Airport.

First, a linear regression trend was applied to historical enplanement data. This analysis failed to account for the rapid growth anticipated in the first five years following improvements to airport facilities. So, an exponential growth trend was applied to the historical enplanement data. This correlated with the forecasts prepared by Cornoyer-Hedrick through the year 2000; however, in the 6 to 10 year and 11 to 20 year time frames, the results became excessively large and unrealistic.

The preferred forecast trend combines the exponential growth and linear growth trends. For years 0 to 5, exponential growth is anticipated as existing and new tour operators increase service to the airport immediately upon the completion of a paved runway, taxiway, and apron. For years 6 to 10, a sustainment period is anticipated in which slower growth will occur and carriers will begin providing service with larger aircraft. For years 11 to 20, a linear growth trend applies in which larger aircraft and more passengers can be accommodated upon the completion of a projected runway extension and additional infrastructure developments.

#### **4.6.2 Forecasts of Based Aircraft Activity**

Although no aircraft are currently based at Grand Canyon West Airport, the potential exists for future air tours over the Canyon originating from the Grand Canyon West Airport. As a result of the Notice of Proposed Rulemaking (NPRM) restrictions on the hours and routes of Canyon overflights will most likely be limited. Preliminary indications are that the majority of additional proposed flight free areas are over the eastern portion of Grand Canyon National Park, and that the approved overflight area will be located over the western portion of the Canyon, in close proximity of Grand Canyon West Airport. It is anticipated that flight authorizations in the Hualapai area will be "grand-fathered", and will not be subject to operational caps.

For the forecasts of based aircraft, it is assumed that aircraft will have access from Grand Canyon West airport to the approved overflight areas. The

demand forecasts for based aircraft were estimated by extrapolating a five percent market share of the estimated visitors arriving by ground transportation that would desire an aerial tour of the Canyon. This is a rather conservative estimate compared to Grand Canyon National Park Airport which enplanes approximately 18 percent of its visitors. Utilizing a large sized twin engine turboprop aircraft for the local flights, such as the deHavilland Twin Otter, with an estimated passenger load of 14 passengers per flight results in a demand for 183 flights, or 366 operations, in the year 1997 and 352 flights, or 704 operations, in the year 2001. Assuming an average flight time of 1.5 hours, and an average of 247 flight hours per year per aircraft for two-engine turboprop aircraft with 13 or more seats<sup>1</sup>, a requirement of 1.11 aircraft in 1997 and 2.14 aircraft in 2001 is estimated.

Although there is a forecasted demand for aircraft to be based at Grand Canyon West, an actual based aircraft is not anticipated until adequate aircraft fueling and employee lodging facilities are established at the airport in the three to five year time frame as indicated in the based aircraft demand vs. supply forecast in Table IV-3. It should also be noted that additional aircraft are not supplied until demand for the aircraft exceeds 150 flight hours per year or approximately 60% aircraft utilization. The number of local annual enplanements are added to the forecast trend computed in Section 4.6.1 and are included in the Summary of Annual Enplanements in Table IV-3.

<sup>1</sup> General Aviation Manufacturers Association 1996 Statistical Databook

**TABLE IV-3  
BASED AIRCRAFT REQUIREMENTS**

| Year | Ground Visitors <sup>1</sup> | Market Share (5%) | Departures Required | Aircraft Demand | Aircraft Supplied | Annual Operations <sup>2</sup> | Annual Enplanements <sup>2</sup> |
|------|------------------------------|-------------------|---------------------|-----------------|-------------------|--------------------------------|----------------------------------|
| 1997 | 51,400                       | 2,600             | 183                 | 1.1             | 1                 | 400                            | 2,300                            |
| 2001 | 98,700                       | 4,900             | 353                 | 2.1             | 2                 | 700                            | 4,600                            |
| 2006 | 149,200                      | 7,500             | 533                 | 3.2             | 3                 | 1000                           | 6,900                            |
| 2016 | 250,200                      | 12,500            | 894                 | 5.4             | 5                 | 1600                           | 11,500                           |

<sup>1</sup>Armstrong Consultants, Inc. projection. Rounded to nearest hundred.

<sup>2</sup>Rounded to nearest hundred.

#### 4.6.3 Annual Operations

To determine the forecasts of annual operations, the same procedure as used in Section 4.5 was applied to the forecast of annual enplanements to arrive at the forecast of annual itinerant operations. For this computation, forecasted load factor and aircraft size groups were applied as discussed below and as indicated in Table IV-4. The number of local operations was added to the itinerant operations resulting in the total forecasted annual operations.

As the number of enplaned passengers increases at Grand Canyon West Airport, it is anticipated that tour operators will utilize larger aircraft to

---

transport more passengers per flight. Respectively, the boarding load factor will decrease slightly. In the short term growth years (0 to 5 years) aircraft with 10 to 19 seats and 20 to 49 seats will begin to emerge. In the medium time frame (5 to 10 years), use of aircraft with 10 to 19 and 20 to 49 seats will continue to increase, and aircraft with 50-100 seats will be introduced. Weekend flights and/or intermittent weekday flights with over 100 seat aircraft are possible. In the long range (11 to 20 years), the majority of aircraft servicing Grand Canyon West aircraft will be aircraft with 10 to 19 and 20 to 49 seats. With the completion of adequate lodging facilities, short haul commercial aircraft with over 100 seats may offer daily service to the airport.

There are no historical records of ceiling and visibility conditions at Grand Canyon West Airport; therefore, survey responses and data obtained from Grand Canyon National Park Airport were used as tools to determine forecasts of instrument operations at Grand Canyon West Airport. Use of the Grand Canyon West Airport is driven by tourists interested in seeing the aesthetic beauty of the Canyon. When ceilings are low and visibility obscured, tourist demand is respectively low and there is essentially little need to conduct aircraft operations. None of the tour operators indicated an instrument approach as a priority on their responses to the user's surveys. Instrument operations at Grand Canyon National Park account for approximately 1% of total annual operations and are not expected to exceed 1.5% of annual operations over the next twenty years.

Instrument operations at Grand Canyon West would not be expected to exceed approximately 1% of annual operations. Should an instrument approach be implemented at Grand Canyon West Airport, the number of estimated instrument operations are listed in Table IV-45.

**TABLE IV-4  
FORECASTS OF ANNUAL OPERATIONS**

| <b>Forecasts of Annual Operations</b> |               |                |               |               |               |
|---------------------------------------|---------------|----------------|---------------|---------------|---------------|
| Seating Range (Example Aircraft)      | Average Seats | Base Year 1994 | 2001          | 2006          | 2016          |
| 0-9 Seats (C-402, C-207)              | 5             | >99%           | 62%           | 53%           | 47%           |
| 10-19 Seats (Beech 1900, DHC-6)       | 15            | <1%            | 25%           | 30%           | 30%           |
| 20-49 Seats (F-27, Dash 8)            | 35            | 0%             | 13%           | 15%           | 20%           |
| 50-100 Seats (Dash 7, F-28)           | 75            | 0%             | 0%            | 1%            | 2%            |
| Over 100 Seats (B-727, DC-9)          | 170           | 0%             | 0%            | 1%            | 1%            |
|                                       |               |                |               |               |               |
| Seats per Departure                   |               | 5              | 11.4          | 14.9          | 17.05         |
| Boarding Load Factor                  |               | 0.85           | 0.80          | 0.75          | 0.70          |
| Enplanements per Departure            |               | 4.25           | 9.12          | 11.13         | 11.9          |
|                                       |               |                |               |               |               |
| Annual Itinerant Enplanements         |               | 44,000         | 170,000       | 194,000       | 319,000       |
| Annual Itinerant Departures           |               | 10,400         | 18,600        | 17,400        | 26,700        |
|                                       |               |                |               |               |               |
| Annual Itinerant Operations           |               | 20,700         | 37,200        | 34,800        | 53,400        |
| Annual Local Operations               |               | 0              | 700           | 1,000         | 1,600         |
| <b>TOTAL ANNUAL OPERATIONS</b>        |               | <b>20,700</b>  | <b>37,900</b> | <b>35,800</b> | <b>55,000</b> |
| Estimated Instrument Operations       |               | N/A            | 400           | 400           | 600           |

*Annual operations rounded to nearest hundred.*

A further analysis can be made by applying the forecasted fleet mix in Table IV-5 to the total annual operations. This results in the forecasted number of operations by respective aircraft type and is shown in Table IV-6.

**TABLE IV-5  
FORECASTED AIRCRAFT FLEET MIX**

| Year | Single Engine | ME Piston | Turbo Prop | Jet | Rotorcraft | Other |
|------|---------------|-----------|------------|-----|------------|-------|
| 2001 | 47%           | 13%       | 25%        | 12% | 3%         | 0%    |
| 2006 | 45%           | 13%       | 26%        | 13% | 3%         | 0%    |
| 2016 | 43%           | 13%       | 27%        | 14% | 3%         | 0%    |

**TABLE IV-6  
DETAILED FORECASTS OF OPERATIONS  
BY AIRCRAFT TYPE**

| <b>TYPE</b>   | <b>2001</b>   | <b>2006</b>   | <b>2016</b>   |
|---------------|---------------|---------------|---------------|
| Single Engine |               |               |               |
| Local         | 0             | 0             | 0             |
| Itinerant     | 17,500        | 15,700        | 23,000        |
| ME Piston     |               |               |               |
| Local         | 0             | 0             | 0             |
| Itinerant     | 4,800         | 4,500         | 6,900         |
| ME Turboprop  |               |               |               |
| Local         | 700           | 1,000         | 1,600         |
| Itinerant     | 9,300         | 9,000         | 14,500        |
| Jet           |               |               |               |
| Local         | 0             | 0             | 0             |
| Itinerant     | 4,500         | 4,600         | 7,500         |
| Rotorcraft    |               |               |               |
| Local         | 0             | 0             | 0             |
| Itinerant     | 1,100         | 1,000         | 1,600         |
| <b>TOTAL</b>  | <b>37,900</b> | <b>35,800</b> | <b>55,100</b> |

*Annual operations rounded to the nearest hundred.*

#### **4.6.4 Summary of Annual Aircraft Operations and Enplanements Forecasts**

The total forecasted annual aircraft operations and annual enplanements are summarized for the short, medium, and long range in Table IV-7.

**TABLE IV-7  
SUMMARY OF FORECASTS OF AVIATION ACTIVITY**

|                     | <b>2001</b> | <b>2006</b> | <b>2016</b> |
|---------------------|-------------|-------------|-------------|
| Annual Operations   | 37,900      | 35,800      | 55,100      |
| Annual Enplanements | 175,000     | 201,000     | 331,000     |

*Annual operations rounded to the nearest hundred.*

*Annual enplanements rounded to the nearest thousand.*

#### **4.7 AIRPORT SEASONAL USE DETERMINATION**

A seasonal fluctuation in aircraft operations may be expected at any airport. This fluctuation is most apparent in regions with severe winter weather patterns or seasonal tourism patterns.

Historical monthly operations data for Grand Canyon West Airport was not available

to establish a seasonal use trend. Data obtained from 1990 Grand Canyon National Park Airport Air Traffic Control Tower Records was used to develop the seasonal use trend for Grand Canyon West. The monthly use percentages are listed in Table IV-8 below and are depicted graphically in Figure 4-2. Grand Canyon National Park Airport, located in Tusayan, Arizona provides a similar service to that of the Grand Canyon West Airport. Both airports serve a similar market and are situated in virtually identical climates. The seasonal use trend is driven primarily by the tourist market and preferred vacation and travel periods, and to a lesser degree by climate.

**TABLE IV-8  
SEASONAL USE TREND CURVES**

| <b>MONTH</b> | <b>% OF OPERATIONS<sup>1</sup></b> |
|--------------|------------------------------------|
| January      | 3.24%                              |
| February     | 4.28%                              |
| March        | 6.18%                              |
| April        | 7.87%                              |
| May          | 10.15%                             |
| June         | 10.97%                             |
| July         | 13.43%                             |
| August       | 14.06%                             |
| September    | 10.75%                             |
| October      | 9.78%                              |
| November     | 5.82%                              |
| December     | 3.53%                              |

<sup>1</sup> Percentages do not add due to rounding.

Source: Grand Canyon National Park Airport Air Traffic Control Records 1990

## **4.8 AIRPORT CAPACITY CALCULATION METHODOLOGY**

The methodology for computing the relationship between an airport's demand versus its capacity is contained in FAA Advisory Circular AC 150/5060-5, *Airport Capacity and Delay*.

In order to facilitate this comparison, computations were made to determine the hourly capacity of the existing airport in Visual Flight Rules (VFR) conditions. Similar computations were made for the airport in its ultimate configuration. That is, including the construction of a full parallel taxiway and sufficient exit taxiways.

The Annual Service Volume (ASV) of the airport in its ultimate development condition was also determined.

The above determinations were made using the assumptions recommended in the Advisory Circular for the particular airport layout and conditions, combined with the

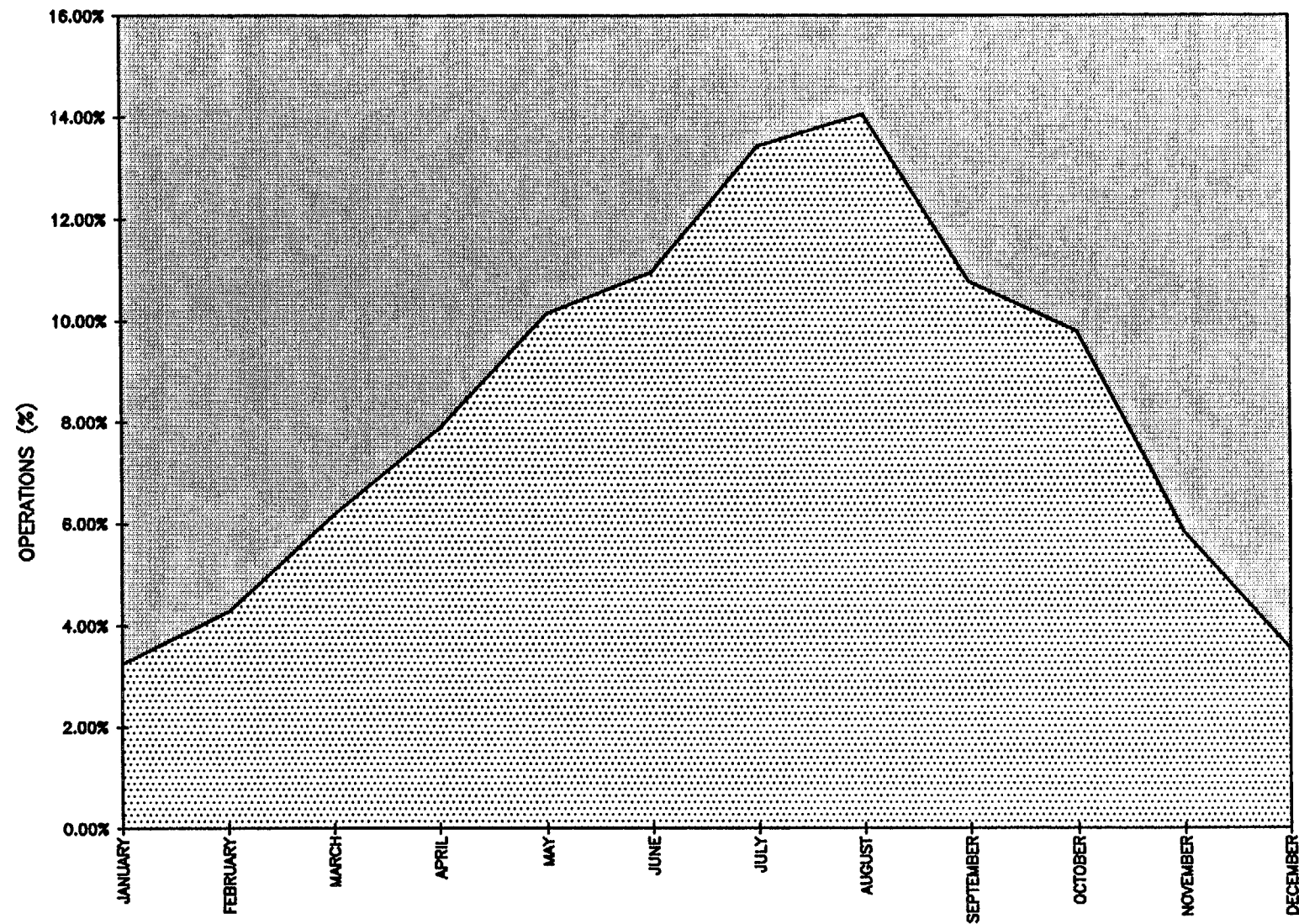


FIGURE 4-2  
GRAND CANYON WEST AIRPORT  
SEASONAL USE TREND

forecast operational data generated with this study.

In the following table is a tabulation of the physical aspects of the four aircraft classes (not to be confused with the aircraft approach categories discussed in Chapter 2), as considered in the capacity computations.

**TABLE IV-9**  
**FAA AIRCRAFT CLASSIFICATIONS FOR CAPACITY CONSIDERATIONS**

| CLASS | MAXIMUM TAKEOFF WEIGHT | ENGINES      |
|-------|------------------------|--------------|
| A     | 12,500 lbs. Or less    | Single       |
| B     | 12,500 lbs. Or less    | Multi Engine |
| C     | 12,500 to 300,000 lbs. | Multi Engine |
| D     | over 300,000 lbs.      | Multi Engine |

The Grand Canyon West Airport, in its existing configuration, is served by visual approaches and is primarily used by Class A and B aircraft. Class C aircraft are not presently using the airport, but are expected to do so in the future. No airspace limitations exist which would affect runway use. In all calculations, it is assumed that arrivals equal departures, and that "touch and go" activity accounts for less than 25% of the total operations.

#### **4.9 RUNWAY CAPACITY - EXISTING CONDITION**

Using the above conditions and applying them to the Hourly Capacity charts in the Advisory Circular, it is seen that the average peak capacities for the existing airport without a parallel taxiway are as follows:

**TABLE IV-10**  
**HOURLY CAPACITY - OPERATIONS PER HOUR**  
**EXISTING CONDITION**

| RUNWAY    | VFR Ops /Hour |
|-----------|---------------|
| Runway 17 | 50            |
| Runway 35 | 66            |

#### **4.10 RUNWAY CAPACITY - ULTIMATE CONDITION**

The addition of a full parallel taxiway will increase the utility and safety of the existing airport. If there were no change to the fleet mix, i.e. 100 percent Class A and B, the hourly capacity with the proposed improvements would be 104 operations per hour. However, a significant change in the fleet mix is expected. For ultimate conditions, approximately 47 percent of operations are expected to be Class A and B, 53 percent Class C, and no Class D aircraft. The resulting hourly capacity for visual and instrument conditions is indicated below.

**TABLE IV-11**  
**HOURLY CAPACITY - OPERATIONS PER HOUR**  
**ULTIMATE CONDITION**

| <b>RUNWAY</b> | <b>VFR Ops/Hour</b> | <b>IFR Ops/Hour</b> |
|---------------|---------------------|---------------------|
| Runway 17     | 63                  | 56                  |
| Runway 35     | 63                  | 56                  |

#### **4.11 HOURLY DEMAND AND PEAKING TENDENCIES**

In order to arrive at a reasonable estimate of the actual demand upon the airport facilities, it was necessary to develop a method to calculate the estimated Maximum Peak Hourly Demand which might be expected to occur during the hours of peak usage of the airport. The Seasonal Use Trend Curve, as presented in Table IV-8, was used as a tool to determine this usage.

Using the Seasonal Use information, a formula was derived which will calculate the average daily operations in a given month, based on the percentage of the total annual operations for that month, as determined by the curve. The formula is as follows:

|                |   |  |
|----------------|---|--|
| <i>Where</i> T | = | Monthly percent of use (from curve).       |
| M              | = | Average monthly operations.                |
| A              | = | Total annual operations.                   |
| D              | = | Average Daily Operations in a given month. |
| M              | = | $A ( T / 100 )$                            |
| D              | = | $M / ( 365 / 12 )$                         |

Experience has shown that approximately 90% of total daily operations will occur between the hours of 7:00 AM and 7:00 PM (12 hours) at a typical general aviation airport, and that the maximum peak hourly occurrence may be 50% greater than the average of the hourly operations calculated for this time period.

The Estimated Peak Hourly Demand (P) in a given month was, therefore, determined by compressing 90% of the Average Daily Operations (D) in a given month into the 12 hour peak use period, reducing that number to an hourly average for the peak use period, and increasing the result by 50%, as follows:

|                |   |  |
|----------------|---|--|
| <i>Where</i> D | = | Average Daily Operations in a given month. |
| P              | = | Peak Hourly Demand in a given month.       |
| P              | = | $1.5 ( 0.90D / 12 )$                       |

Passenger demand was calculated by multiplying the estimated passengers per departure, from Table IV-4, by the respective daily (D) or hourly operations (P). Passenger demand (passenger throughput) will be twice the number of passenger enplanements (number of visitors departing by air) assuming each passenger will have to be handled twice; once on arrival and once on departure.

The calculations were made for each month of each of the forecast periods. The results of the calculations are in Table IV-12.

As is evident in the table, the Maximum Peak Hourly Demand occurs in August, with 20 operations per hour forecasted in 2001, 19 operations per hour in 2006, and 29 operations per hour in 2016. Because of the utilization of larger aircraft in the year 2006, the Maximum Peak Hourly Passenger Demand increases from 180 to 207 even though the number of operations decreases from 20 to 19. The Peak Hourly Passenger Demand in 2016 is 341 passengers per hour occurring in the month of August.

**TABLE IV-12  
ESTIMATED HOURLY OPERATIONS AND PASSENGER  
DEMAND PER MONTH**

| <b>Monthly/Daily/Hourly Demand</b> |              |              |            |           |              |            |
|------------------------------------|--------------|--------------|------------|-----------|--------------|------------|
| Planning Year: 2001                |              |              |            |           |              |            |
| Operations: 38,000                 |              |              |            |           |              |            |
| Passengers/Operation: 9.12         |              |              |            |           |              |            |
| Month                              | % Use        | Operations   |            |           | Passengers   |            |
|                                    |              | Monthly      | Daily      | Hourly    | Daily        | Hourly     |
| January                            | 3.24         | 1,231        | 40         | 5         | 369          | 42         |
| February                           | 4.28         | 1,626        | 53         | 6         | 488          | 55         |
| March                              | 6.18         | 2,348        | 77         | 9         | 704          | 79         |
| April                              | 7.87         | 2,991        | 98         | 11        | 897          | 101        |
| May                                | 10.15        | 3,857        | 127        | 14        | 1,156        | 130        |
| June                               | 10.97        | 4,169        | 137        | 15        | 1,250        | 141        |
| July                               | 13.43        | 5,103        | 168        | 19        | 1,530        | 172        |
| <b>August</b>                      | <b>14.06</b> | <b>5,343</b> | <b>176</b> | <b>20</b> | <b>1,602</b> | <b>180</b> |
| September                          | 10.75        | 4,085        | 134        | 15        | 1,225        | 138        |
| October                            | 9.78         | 3,716        | 122        | 14        | 1,114        | 125        |
| November                           | 5.82         | 2,212        | 73         | 8         | 663          | 75         |
| December                           | 3.53         | 1,341        | 44         | 5         | 402          | 45         |
| Planning Year: 2006                |              |              |            |           |              |            |
| Operations: 35,800                 |              |              |            |           |              |            |
| Passengers/Operation: 11.13        |              |              |            |           |              |            |
| Month                              | % Use        | Operations   |            |           | Passengers   |            |
|                                    |              | Monthly      | Daily      | Hourly    | Daily        | Hourly     |
| January                            | 3.24         | 1,160        | 38         | 4         | 424          | 48         |
| February                           | 4.28         | 1,532        | 50         | 6         | 561          | 63         |
| March                              | 6.18         | 2,212        | 73         | 8         | 810          | 91         |
| April                              | 7.87         | 2,817        | 93         | 10        | 1,031        | 116        |
| May                                | 10.15        | 3,634        | 119        | 13        | 1,330        | 150        |
| June                               | 10.97        | 3,927        | 129        | 15        | 1,437        | 162        |
| July                               | 13.43        | 4,808        | 158        | 18        | 1,759        | 198        |
| <b>August</b>                      | <b>14.06</b> | <b>5,033</b> | <b>165</b> | <b>19</b> | <b>1,842</b> | <b>207</b> |
| September                          | 10.75        | 3,849        | 127        | 14        | 1,408        | 158        |
| October                            | 9.78         | 3,501        | 115        | 13        | 1,281        | 144        |
| November                           | 5.82         | 2,084        | 69         | 8         | 762          | 86         |
| December                           | 3.53         | 1,264        | 42         | 5         | 462          | 52         |

*Continued on next page...*

**TABLE IV-12 (continued)**  
**ESTIMATED HOURLY OPERATIONS AND PASSENGER**  
**DEMAND PER MONTH**

| <b>Monthly/Daily/Hourly Demand</b> |              |              |            |           |              |            |
|------------------------------------|--------------|--------------|------------|-----------|--------------|------------|
| Planning Year: 2016                |              |              |            |           |              |            |
| Operations: 55,100                 |              |              |            |           |              |            |
| Passengers/Operation: 11.90        |              |              |            |           |              |            |
| Month                              | % Use        | Operations   |            |           | Passengers   |            |
|                                    |              | Monthly      | Daily      | Hourly    | Daily        | Hourly     |
| January                            | 3.24         | 1,785        | 59         | 7         | 698          | 79         |
| February                           | 4.28         | 2,358        | 78         | 9         | 923          | 104        |
| March                              | 6.18         | 3,405        | 112        | 13        | 1,332        | 150        |
| April                              | 7.87         | 4,336        | 143        | 16        | 1,697        | 191        |
| May                                | 10.15        | 5,593        | 184        | 21        | 2,188        | 246        |
| June                               | 10.97        | 6,044        | 199        | 22        | 2,365        | 266        |
| July                               | 13.43        | 7,400        | 243        | 27        | 2,895        | 326        |
| <b>August</b>                      | <b>14.06</b> | <b>7,747</b> | <b>255</b> | <b>29</b> | <b>3,031</b> | <b>341</b> |
| September                          | 10.75        | 5,923        | 195        | 22        | 2,317        | 261        |
| October                            | 9.78         | 5,389        | 177        | 20        | 2,108        | 237        |
| November                           | 5.82         | 3,207        | 105        | 12        | 1,255        | 141        |
| December                           | 3.53         | 1,945        | 64         | 7         | 761          | 86         |

Assuming a full length parallel taxiway in the future, the Maximum Peak Hourly Demand in 2001 represents approximately 30% of the estimated hourly operations capacity of the facility, and 46% in 2016.

#### **4.12 ANNUAL SERVICE VOLUME**

The Annual Service Volume, or ASV, is a calculated reasonable estimate of an airport's annual capacity, taking into account differences in runway utilization, weather conditions and aircraft mix that would be encountered in a year's time. When compared to the forecast or existing operations of an airport, the ASV will give an indication of the adequacy of a facility in relationship to its activity level.

The ASV is determined by reference to the charts contained in FAA Advisory Circular AC 150/5060-5.

The approximate Annual Service Volume for the Grand Canyon West Airport in its ultimate condition is 205,000 operations/year. It is, therefore, evident that the facility will not exceed its capacity within the time frame of this study, since it will theoretically be functioning at less than 28% of its ASV.

#### **4.13 CRITICAL AIRCRAFT DETERMINATION**

The "critical", or "design", aircraft for any given airport facility is defined as that aircraft (or group of aircraft) whose dimensional and/or performance characteristics are the basis for selection of facilities design criteria. The critical aircraft must be demonstrated to account for a minimum of 500 annual actual or forecast operations.

---

Different aircraft may govern the requirements for runway design, and for lateral and vertical separation standards. The factors usually considered are the aircraft maximum gross takeoff weight, approach speed category, wingspan, and tail height.

The aircraft currently using the Grand Canyon West facilities is a mix of ARC A-I, B-I, and A-II single and multi-engine aircraft. Single-engine A-I and B-I aircraft account for over 99% of annual operations. Operations of B-II aircraft, which is a deHavilland Twin Otter operated by Scenic Air, accounts for less than 50 annual operations. Therefore, the existing Airport Reference Code should be considered a B-I.

As the future improvements are made, and as tour operations grow at Grand Canyon West, larger aircraft are expected to be utilized. For future planning, 0 to 10 years, the Airport Reference Code is expected to be a C-III weighing less than 60,000 pounds based on a combination of operations by Fokker 27, deHavilland Dash 8, Convair, and business jet aircraft including Gulfstreams, Falcons, and Learjets. For ultimate planning, 10 to 20 years, the Airport Reference Code is expected to be a C-III weighing more than 60,000 pounds based on a combination of operations by Boeing 727 and 737, and McDonnell Douglas DC-9 aircraft.

Table IV-13 lists the representative design fleet for future airport development in the 0 to 5 year time frame. These are C-III aircraft weighing less than 30,000 pounds. In the 5 to 10 year time frame, the runway should be strengthened to accommodate the larger aircraft weighing up to 60,000 pounds listed in Table IV-14. Ultimately, in the 10 to 20 year period, the runway should be lengthened to approximately 10,000 feet and strengthened to accommodate the C-III aircraft listed in Table IV-15 weighing more than 60,000 pounds.

**TABLE IV-13**  
**GRAND CANYON WEST AIRPORT**  
**Design Fleet for**  
**Future Development, 0 to 5 Years: (C-III, 30,000lb or less)**

**P A R A M E T E R S :**

DENSITY ALTITUDE : 8000 MSL

GENERAL TYPE CODE : General

U.S CUSTOMARY UNITS : Speed in knots.....Lengths in Feet.....Weight in Pounds

|               |        |        |        |        |          |         |
|---------------|--------|--------|--------|--------|----------|---------|
| Greater Than: | 0.00   | 0.00   | 0.00   | 0.00   | 0.00     | 0.00    |
| & Less Than:  | 141.00 | 118.00 | 200.00 | 100.00 | 30000.00 | 6360.00 |

| Model                   | AppSpeed | WingSpan | AcLength | TailHite | ToWeight | RWindex |
|-------------------------|----------|----------|----------|----------|----------|---------|
| AeroCommander 680E      | ---      | 49.00    | 35.08    | 14.42    | 7700     | 2325    |
| AeroCommander 560A      | ---      | 44.08    | 35.08    | 14.42    | 6000     | 3120    |
| AeroCommander 560E      | ---      | 49.00    | 35.08    | 14.42    | 6500     | 4840    |
| Aeronca 11CC            | ---      | 36.08    | 20.58    | 8.75     | ----     | ----    |
| Aeronca 7CCM Champ      | ---      | 35.00    | 21.42    | 8.58     | ----     | ----    |
| Aeronca 7DC Champ       | ---      | 35.00    | 21.42    | 8.58     | ----     | ----    |
| Aeronca 7AC Champ       | 43       | 35.00    | 21.42    | 8.58     | 1220     | ----    |
| Aeronca 11AC Chief      | ---      | 36.08    | 20.33    | 8.75     | ----     | ----    |
| Alon Aircoupe A-2       | ---      | 30.00    | 20.17    | 5.08     | ----     | ----    |
| Alon Aircoupe F-1       | ---      | 30.00    | 20.08    | 6.25     | ----     | ----    |
| BAe Jetstream 3100      | 109      | 52.00    | 47.10    | 17.50    | 14550    | ----    |
| Beechcraft 65 Queen Air | 90       | 45.88    | 33.33    | 14.17    | 7700     | 4220    |
| Beechcraft B55          | 95       | 37.80    | 28.00    | 9.60     | 5100     | ----    |
| Beechcraft E55          | 95       | 37.80    | 29.90    | 9.10     | 5300     | ----    |
| Beechcraft 58           | 96       | 37.80    | 29.90    | 9.50     | 5550     | ----    |
| Beechcraft 58P          | 101      | 37.80    | 29.90    | 9.10     | 6200     | ----    |
| Beechcraft 58TC         | 101      | 37.80    | 29.90    | 9.10     | 6200     | ----    |
| Beechcraft A36          | 68       | 33.50    | 27.50    | 8.40     | 3650     | ----    |
| Beechcraft B36TC        | 74       | 37.80    | 27.50    | 8.40     | 3850     | ----    |
| Beechcraft F33A         | 66       | 33.50    | 26.70    | 8.30     | 3400     | ----    |
| Beechcraft V35B         | 66       | 33.50    | 26.40    | 7.60     | 3400     | ----    |
| Beechcraft C99          | 107      | 45.90    | 44.50    | 14.40    | 11300    | ----    |
| Beech Duchess 76        | 78       | 38.00    | 29.00    | 9.50     | 3900     | ----    |
| Beech Duke B60          | 98       | 39.30    | 33.80    | 12.30    | 6775     | ----    |
| Beechcraft C90          | 99       | 50.30    | 35.50    | 14.30    | 9650     | ----    |
| Beechcraft F90          | 103      | 45.90    | 39.80    | 15.10    | 10950    | ----    |
| Beech C23               | 66       | 32.80    | 25.80    | 8.30     | 2450     | ----    |
| Beech Sierra C24R       | 78       | 32.80    | 25.80    | 8.10     | 2750     | ----    |
| Beech Skipper 77        | 61       | 30.00    | 24.00    | 6.90     | 1675     | ----    |
| Beechcraft C23          | 68       | 32.80    | 25.80    | 8.30     | 2450     | ----    |
| Beechcraft B200         | 98       | 54.50    | 43.80    | 15.00    | 12500    | 4500    |
| Beechcraft B200         | 98       | 54.50    | 43.80    | 15.00    | 11000    | 4200    |
| Beechcraft B300         | 107      | 54.50    | 43.70    | 15.00    | 14000    | ----    |
| Beechcraft 1900         | 120      | 54.50    | 57.80    | 14.90    | 15245    | ----    |
| Beechcraft E-18S        | 87       | 49.20    | 35.10    | 10.50    | 9300     | 5290    |
| Beechcraft B100         | 111      | 45.90    | 39.90    | 15.40    | 11500    | 5400    |
| Beechcraft B100         | 111      | 45.90    | 39.90    | 15.40    | 10000    | 4700    |
| BritainNorman BN2B      | 51       | 49.00    | 35.70    | 12.90    | 6600     | ----    |
| Casa C-212              | 92       | 62.30    | 49.80    | 21.80    | 16427    | ----    |
| Cessna 152              | 56       | 33.20    | 24.10    | 8.50     | 1670     | ----    |
| Cessna 170              | 65       | 36.00    | 25.00    | 6.42     | 2200     | ----    |
| Cessna Cutlass          | 62       | 36.00    | 26.10    | 8.10     | 2550     | ----    |
| Cessna 172RG            | 65       | 36.00    | 27.40    | 8.80     | 2650     | ----    |
| Cessna 177              | 64       | 35.63    | 26.96    | 9.08     | 2350     | ----    |
| Cessna 177B             | 60       | 35.50    | 27.25    | 8.58     | 2500     | 2840    |
| Cessna 182Q             | 64       | 36.00    | 28.00    | 9.20     | 2950     | 2740    |

| Model                    | AppSpeed | WingSpan | AcLength | TailHite | ToWeight | RWindex |
|--------------------------|----------|----------|----------|----------|----------|---------|
| Cessna T182              | 70       | 36.00    | 28.40    | 9.20     | 3100     | ----    |
| Cessna R182              | 65       | 36.00    | 28.60    | 8.90     | 3100     | ----    |
| Cessna TR182             | 65       | 35.80    | 28.60    | 8.90     | 3100     | ----    |
| Cessna U206G             | 70       | 36.00    | 28.20    | 9.20     | 3600     | ----    |
| Cessna TU206G            | 70       | 36.00    | 28.20    | 9.30     | 3600     | ----    |
| Cessna 207A              | 75       | 35.80    | 32.20    | 9.60     | 3800     | ----    |
| Cessna T207A             | 75       | 35.80    | 32.20    | 9.60     | 3800     | ----    |
| Cessna T210N             | 75       | 36.80    | 28.20    | 9.70     | 4000     | ----    |
| Cessna P210N             | 75       | 36.80    | 28.20    | 9.60     | 4000     | ----    |
| Cessna T303              | 81       | 39.00    | 30.40    | 13.20    | 5150     | ----    |
| Cessna 310R              | 93       | 36.92    | 31.96    | 10.67    | 5500     | 6034    |
| Cessna 208 Caravan       | 72       | 51.80    | 37.60    | 14.20    | 7000     | ----    |
| Cessna Agtruck           | 73       | 41.70    | 25.90    | 8.20     | 4200     | ----    |
| Cessna Aghusky           | 75       | 41.70    | 26.50    | 8.10     | 4400     | ----    |
| Cessna Citation I C500   | 107      | 47.10    | 43.50    | 14.30    | 11850    | ----    |
| Cessna 525 CitationJet   | 107      | 46.67    | 42.50    | 13.58    | 10400    | ----    |
| Cessna Citation II C550  | 105      | 52.20    | 47.20    | 15.00    | 14300    | ----    |
| Cessna Citation III C650 | 116      | 53.50    | 55.50    | 17.30    | 21000    | ----    |
| DHC-6-300                | 75       | 65.00    | 51.80    | 19.50    | 12500    | ----    |
| Eagle 300                | ---      | 55.00    | 27.50    | 10.90    | 5400     | ----    |
| Embraer EMB-110P2        | 94       | 50.30    | 49.50    | 16.10    | 12500    | ----    |
| Falcon 10                | 104      | 42.90    | 45.50    | 15.10    | 14000    | 3650    |
| Falcon 10                | 104      | 42.90    | 45.50    | 15.10    | 16000    | 4300    |
| Falcon 10                | 104      | 42.90    | 45.50    | 15.10    | 18740    | 6100    |
| Falcon 20                | 107      | 53.50    | 56.30    | 17.40    | 18000    | 3600    |
| Falcon 200               | 114      | 53.50    | 56.30    | 17.40    | 20000    | 3750    |
| Falcon 200               | 114      | 53.50    | 56.30    | 17.40    | 26000    | 4700    |
| Falcon 50                | 113      | 61.90    | 60.80    | 22.90    | 22000    | 3500    |
| Falcon 900               | 100      | 63.40    | 66.30    | 24.80    | 28000    | 3325    |
| Fairchild 300            | 116      | 47.90    | 42.20    | 16.80    | 13230    | ----    |
| Fairchild SA227-AC       | 113      | 57.00    | 59.40    | 16.70    | 14500    | ----    |
| Fairchild SA227-PC       | 113      | 57.00    | 59.40    | 16.70    | 14500    | ----    |
| GAF Nomad N24A           | 74       | 54.20    | 47.00    | 18.20    | 9400     | ----    |
| Gulfstream AE840         | 98       | 52.10    | 43.00    | 15.00    | 10325    | ----    |
| Gulfstream AE900         | 100      | 52.10    | 42.90    | 14.90    | 10700    | ----    |
| Gulfstream AE1000        | 103      | 52.10    | 43.00    | 14.90    | 11200    | ----    |
| HS.125-700               | 108      | 47.00    | 50.80    | 17.60    | 24800    | ----    |
| HS.125-800               | 111      | 51.37    | 51.14    | 17.58    | 27400    | ----    |
| Interceptor 400A         | 78       | 30.50    | 27.40    | 10.10    | 4030     | ----    |
| International BN2A       | 65       | 53.00    | 44.80    | 14.20    | 10000    | ----    |
| Lake 200EP               | 51       | 38.00    | 25.00    | 9.30     | 2690     | ----    |
| Lake IA-250              | 69       | 38.00    | 28.10    | 10.00    | 3050     | ----    |
| Learjet 23               | 128      | 35.58    | 43.17    | 12.00    | 10500    | 5000    |
| Learjet 24B              | 128      | 35.58    | 43.25    | 12.58    | 13500    | 5150    |
| Learjet 24B              | 128      | 35.58    | 43.25    | 12.58    | 12000    | 4150    |
| Learjet 25B/C            | 137      | 35.58    | 47.50    | 12.50    | 12000    | 4050    |
| Learjet 25D/F            | 137      | 35.58    | 47.58    | 12.25    | 12000    | 4200    |
| Learjet 25G              | 137      | 35.58    | 47.58    | 12.25    | 16300    | ----    |
| Learjet 28/29            | 120      | 43.75    | 47.58    | 12.25    | 15000    | 4750    |
| Learjet 28/29            | 120      | 43.75    | 47.58    | 12.25    | 13000    | 4000    |
| Learjet 31               | 129      | 39.50    | 48.70    | 12.30    | 10000    | 4060    |
| Learjet 31               | 129      | 39.50    | 48.70    | 12.30    | 14000    | 4690    |
| Learjet 35A/36A          | 129      | 39.50    | 48.70    | 12.30    | 18300    | ----    |
| Learjet 55C              | 128      | 43.75    | 55.08    | 14.67    | 17000    | 5140    |
| Lear Fan 2100            | 104      | 39.30    | 40.60    | 12.20    | 7350     | ----    |
| Merlin IVC               | 113      | 57.00    | 59.33    | 16.67    | 12500    | 4500    |
| Merlin IVC               | 113      | 57.00    | 59.33    | 16.67    | 16000    | 6300    |
| Metro III                | 112      | 46.20    | 59.40    | 16.70    | 12500    | 4500    |
| Mitsubishi 2B-400        | 101      | 39.20    | 33.30    | 12.90    | 10470    | ----    |
| Mitsubishi 2B-60         | 105      | 39.20    | 39.40    | 13.70    | 11575    | ----    |
| Mitsubishi MU-300        | 109      | 43.40    | 48.30    | 13.80    | 14630    | ----    |
| Mooney 201 M20J          | 72       | 36.10    | 24.70    | 8.30     | 2740     | ----    |

| Model                     | AppSpeed | WingSpan | AcLength | TailHite | ToWeight | RWindex |
|---------------------------|----------|----------|----------|----------|----------|---------|
| Mooney T231 M20K          | 72       | 36.10    | 25.40    | 8.30     | 2900     | ----    |
| Partenavia P68C           | 74       | 39.40    | 31.30    | 11.20    | 4387     | ----    |
| Piaggio P.166-DL3         | 86       | 48.20    | 39.30    | 16.50    | 9480     | ----    |
| Piper PA-12               | 65       | 35.33    | 22.75    | 6.75     | 1750     | ----    |
| Piper Tomahawk II         | 61       | 34.00    | 23.10    | 9.10     | 1670     | ----    |
| Piper PA-28-161           | 57       | 35.00    | 23.80    | 7.30     | 2440     | ----    |
| Piper PA-28-181           | 64       | 35.00    | 23.80    | 7.30     | 2550     | ----    |
| Piper PA-28-236           | 73       | 35.40    | 24.70    | 7.20     | 3000     | ----    |
| Piper PA-28RT-201T        | 79       | 35.40    | 27.30    | 8.30     | 2900     | ----    |
| Piper PA-31-325           | 91       | 40.70    | 32.60    | 13.00    | 6500     | ----    |
| Piper PA-31-350           | 96       | 40.70    | 34.60    | 13.00    | 7000     | ----    |
| Piper PA-31 T1020         | 96       | 40.70    | 34.60    | 13.00    | 7000     | ----    |
| Piper PA-31 T1040         | 101      | 41.10    | 36.70    | 12.80    | 9000     | ----    |
| Piper PA31T-2XL620        | 104      | 42.70    | 36.70    | 12.80    | 9474     | ----    |
| Piper PA-32-301           | 81       | 36.20    | 27.70    | 8.20     | 3600     | ----    |
| Piper PA-32-301T          | 75       | 36.20    | 28.20    | 8.20     | 3600     | ----    |
| Piper PA-32R-301          | 74       | 36.20    | 27.70    | 8.50     | 3600     | ----    |
| Piper PA-32R-301T         | 73       | 36.20    | 28.50    | 8.50     | 3600     | ----    |
| Piper PA-34-220T Seneca   | 83       | 38.90    | 28.60    | 9.90     | 4750     | ----    |
| Piper PA-42-720           | 116      | 47.70    | 43.40    | 14.80    | 11200    | ----    |
| Piper PA-42-1000          | 116      | 47.70    | 43.40    | 16.40    | 11950    | ----    |
| Piper PA-46 Malibu        | 75       | 43.00    | 28.40    | 11.30    | 4100     | ----    |
| Piper Aerostar 602        | 100      | 36.70    | 34.80    | 12.10    | 6000     | ----    |
| Piper PA60-700P           | 92       | 36.80    | 34.00    | 12.10    | 6315     | ----    |
| Piper PA-31P-350          | 95       | 44.50    | 34.50    | 13.00    | 7200     | ----    |
| Piper PA-23-250 Aztec     | 77       | 37.17    | 31.17    | 10.25    | 5200     | ----    |
| Robin R2160               | 57       | 27.30    | 23.20    | 7.00     | 1764     | ----    |
| Saab 340B                 | 104      | 70.33    | 64.67    | 22.50    | 25000    | 4850    |
| Saab-Fairchild SF 340A    | 104      | 70.33    | 64.67    | 22.50    | 25000    | 5450    |
| Schweizer 600B            | 68       | 42.40    | 24.50    | 11.50    | 7020     | ----    |
| Short SD3.30              | 95       | 74.70    | 58.00    | 16.20    | 22900    | ----    |
| Short SD3.60              | 104      | 74.80    | 70.80    | 23.70    | 26000    | ----    |
| Taylorcraft F21           | 48       | 36.00    | 22.30    | 6.50     | 1500     | ----    |
| Weatherly 620             | 74       | 41.00    | 27.20    | 8.10     | 5600     | ----    |
| IAI Westwind 1124         | 129      | 44.80    | 52.30    | 15.80    | 21000    | 5950    |
| IAI Westwind 1124         | 129      | 44.80    | 52.30    | 15.80    | 18000    | 4300    |
| IAI Westwind 1124A        | 129      | 44.80    | 52.30    | 14.80    | 21000    | 5800    |
| IAI Westwind 1124A        | 129      | 44.80    | 52.30    | 14.80    | 18000    | 4400    |
| Westwind Astra            | 110      | 52.67    | 55.58    | 18.17    | 20000    | 5450    |
| Robinson R22 Alpha        | ---      | 25.20    | 28.70    | 8.80     | 1370     | 50      |
| Robinson R44 Astro        | ---      | 33.00    | 38.17    | 10.83    | 2400     | 66      |
| Hynes H2                  | ---      | 23.70    | 28.00    | 6.80     | 1670     | 48      |
| Hughes 300C               | ---      | 26.80    | 30.80    | 8.80     | 2050     | 54      |
| Enstrom F-28C-2 Falcon    | ---      | 32.00    | 28.20    | 9.20     | 2350     | 64      |
| Enstrom 280C Shark        | ---      | 32.00    | 28.70    | 9.20     | 2350     | 64      |
| Enstrom F-28F             | ---      | 32.00    | 28.20    | 9.20     | 2600     | 64      |
| Hiller UH12E4             | ---      | 35.30    | 28.40    | 9.40     | 3100     | 71      |
| Spitfire Mark I           | ---      | 32.00    | 29.40    | 9.20     | 2350     | 64      |
| Bell 206B JetRanger III   | ---      | 33.30    | 39.10    | 9.50     | 3200     | 67      |
| Hiller FH-1100B           | ---      | 33.60    | 28.30    | 9.10     | 2850     | 67      |
| Hughes 500E               | ---      | 26.40    | 30.80    | 8.70     | 3550     | 53      |
| Aerospatiale AS-350D      | ---      | 35.10    | 42.60    | 10.30    | 4300     | 70      |
| Aerospatiale AS-350B      | ---      | 35.10    | 42.60    | 10.30    | 4300     | 70      |
| Bell 206L-3 LongRanger    | ---      | 37.00    | 42.70    | 10.50    | 4150     | 74      |
| Hughes 530F               | ---      | 27.40    | 31.40    | 8.70     | 3550     | 55      |
| Aerospatiale SA-315B Lama | ---      | 36.20    | 42.40    | 10.10    | 4300     | 72      |
| Spitfire Taurus           | ---      | 48.30    | 39.20    | 12.30    | 7826     | 97      |
| Aerospatiale AS-355F1     | ---      | 35.10    | 42.60    | 10.30    | 5291     | 70      |
| MBB BO 105 CBS            | ---      | 32.20    | 38.90    | 9.80     | 5291     | 64      |
| Agusta 109AII             | ---      | 36.10    | 45.20    | 11.00    | 5730     | 72      |
| Westland Series 100-30    | ---      | 43.60    | 52.10    | 15.50    | 12800    | 87      |
| Bell 222UT                | ---      | 42.00    | 50.00    | 11.20    | 8250     | 84      |

| Model                    | AppSpeed | WingSpan | AcLength | TailHite | ToWeight | RWindex |
|--------------------------|----------|----------|----------|----------|----------|---------|
| MBB BK 117               | ---      | 36.10    | 32.70    | 10.90    | 6283     | 72      |
| Sikorsky S-76 Mark II    | ---      | 44.00    | 52.50    | 14.50    | 10300    | 88      |
| Bell 222B                | ---      | 42.00    | 50.00    | 11.20    | 8250     | 84      |
| Aerospatiale SA365N      | ---      | 39.10    | 44.20    | 13.20    | 8818     | 78      |
| Bell 212 Twin            | ---      | 48.00    | 57.30    | 13.10    | 11200    | 96      |
| Bell 412                 | ---      | 46.00    | 56.00    | 10.70    | 11600    | 92      |
| Bell 214ST               | ---      | 52.00    | 62.10    | 15.80    | 17500    | 104     |
| Aerospatiale AS332C      | ---      | 51.20    | 61.40    | 16.10    | 18410    | 102     |
| Cirrus VK30              | 75       | 39.67    | 26.00    | 10.67    | 3600     | ----    |
| American AAl Yankee      | 74       | 24.50    | 19.25    | 6.83     | 1500     | ----    |
| Quickkit Glass Goose     | 60       | 27.00    | 19.50    | 8.50     | 1750     | ----    |
| Beech Starship 2000A     | 117      | 54.42    | 46.08    | 12.92    | 14900    | ----    |
| Metro II SA226-TC        | 112      | 46.25    | 59.42    | 16.67    | 12500    | 4650    |
| Metro II SA226-TC        | 112      | 46.25    | 59.42    | 16.67    | 10500    | 3050    |
| Metro II SA226-TC        | 112      | 46.25    | 59.42    | 16.67    | 8500     | 2325    |
| Bellanca 8KCAB-180       | 61       | 32.00    | 22.93    | 7.67     | 1800     | ----    |
| Bellanca 17-30A Viking   | 74       | 34.17    | 26.33    | 7.33     | 3325     | ----    |
| American Champion 8GCBC  | 44       | 36.33    | 23.00    | 8.58     | 2150     | ----    |
| Embraer EMB-120 Brasilia | 108      | 64.90    | 65.60    | 20.80    | 24000    | 6000    |
| Cessna 425               | 103      | 44.10    | 35.90    | 12.60    | 8600     | 5265    |
| Cessna 425               | 103      | 44.10    | 35.90    | 12.60    | 8200     | 5115    |
| Cessna 441               | 99       | 49.30    | 34.70    | 12.80    | 9850     | 5084    |
| Cessna 441               | 99       | 49.30    | 34.70    | 12.80    | 7800     | 4447    |
| Cessna 340A              | 92       | 38.10    | 34.30    | 12.60    | 5990     | 4621    |
| Cessna 340A              | 92       | 38.10    | 34.30    | 12.60    | 5000     | 3042    |
| Cessna 402C              | 95       | 44.12    | 36.38    | 11.45    | 6850     | 5028    |
| Cessna 402C              | 95       | 44.12    | 36.38    | 11.45    | 5500     | 3052    |
| Cessna 414A              | 94       | 44.10    | 36.40    | 11.50    | 6750     | 5693    |
| Cessna 414A              | 94       | 44.10    | 36.40    | 11.50    | 5700     | 3856    |
| Cessna 421C              | 96       | 41.10    | 36.40    | 11.50    | 7450     | 4877    |
| Cessna 421C              | 96       | 41.10    | 36.40    | 11.50    | 6200     | 3189    |
| Sabreliner NA-265-80A/SC | 128      | 50.40    | 47.20    | 17.30    | 20000    | 5150    |
| Cessna Citation I/SP     | 107      | 47.10    | 43.50    | 14.33    | 11850    | 4390    |
| Cessna Citation I/SP     | 107      | 47.10    | 43.50    | 14.33    | 10000    | 3140    |

#### C R I T I C A L P A R A M E T E R S

```

=====
Runway Length Index.....( 6300) Merlin IVC @ 16000 #
WingSpan.....( 74.80) Short SD3.60
Tail Height.....( 24.80) Falcon 900
Aircraft Length.....( 70.80) Short SD3.60
Takeoff Weight.....( 28000) Falcon 900
Approach Speed.....( 137) Learjet 25B/C
=====

```

Source: ACDATA version 6.02

**TABLE IV-14**  
**GRAND CANYON WEST AIRPORT**  
**Future Planning, 5 to 10 Years: (C-III, up to 60,000 pounds)**  
**Additional Aircraft Accommodation with**  
**Increased Weight Bearing Capacity**

**P A R A M E T E R S :**

DENSITY ALTITUDE : 8000 MSL

GENERAL TYPE CODE : General

U.S CUSTOMARY UNITS : Speed in knots.....Lengths in Feet.....Weight in Pounds

|               |        |        |        |        |          |         |
|---------------|--------|--------|--------|--------|----------|---------|
| Greater Than: | 0.00   | 0.00   | 0.00   | 0.00   | 30000.00 | 0.00    |
| & Less Than:  | 141.00 | 118.00 | 200.00 | 100.00 | 60000.00 | 6360.00 |

| Model                | AppSpeed | WingSpan | AcLength | TailHite | ToWeight | RWindex |
|----------------------|----------|----------|----------|----------|----------|---------|
| Aeritalia G-222      | 109      | 94.50    | 79.20    | 38.50    | 58422    | ----    |
| BAe 748-2B           | 92       | 102.50   | 67.00    | 24.80    | 46500    | ----    |
| Challenger CL-600    | 134      | 61.80    | 68.40    | 20.70    | 41100    | ----    |
| Challenger CL-601    | 134      | 64.30    | 68.40    | 20.70    | 42100    | ----    |
| Convair 240          | 107      | 91.80    | 74.70    | 26.90    | 42400    | ----    |
| Convair 240          | 107      | 91.80    | 74.70    | 26.90    | 39000    | ----    |
| Convair 240          | 107      | 91.80    | 74.70    | 26.90    | 36000    | ----    |
| DHC-7                | 86       | 93.00    | 80.50    | 26.20    | 44000    | 4300    |
| DHC-7                | 86       | 93.00    | 80.50    | 26.20    | 40000    | 3450    |
| DHC-8-100            | 94       | 85.00    | 73.00    | 25.00    | 34400    | 5250    |
| Falcon 900           | 100      | 63.40    | 66.30    | 24.80    | 34000    | 4200    |
| Fokker F-27          | 101      | 95.20    | 82.30    | 28.70    | 45000    | ----    |
| Gulfstream III       | 136      | 77.80    | 83.10    | 24.40    | 58000    | 5750    |
| Gulfstream III       | 136      | 77.80    | 83.10    | 24.40    | 50000    | 4400    |
| Lockheed Jetstar II  | 132      | 54.42    | 60.42    | 20.42    | 44500    | 5000    |
| Lockheed Jetstar II  | 132      | 54.42    | 60.42    | 20.42    | 36000    | 4800    |
| Boeing Vertol 234 LR | ---      | 60.00    | 99.00    | 18.70    | 48500    | 120     |
| ATR-42-320 w/PW121   | ---      | 80.58    | 74.42    | 24.92    | 36817    | 4922    |
| ATR-42-320 w/PW121   | ---      | 80.58    | 74.42    | 24.92    | 34000    | 4101    |

**C R I T I C A L P A R A M E T E R S** =====

|                           |         |                          |
|---------------------------|---------|--------------------------|
| Runway Length Index.....( | 5750)   | Gulfstream III @ 58000 # |
| WingSpan.....(            | 102.50) | BAe 748-2B               |
| Tail Height.....(         | 38.50)  | Aeritalia G-222          |
| Aircraft Length.....(     | 99.00)  | Boeing Vertol 234 LR     |
| Takeoff Weight.....(      | 58422)  | Aeritalia G-222          |
| Approach Speed.....(      | 136)    | Gulfstream III           |

Source: ACDATA version 6.02

**TABLE IV-15**  
**GRAND CANYON WEST**  
**Critical Aircraft Design Fleet**  
**Ultimate Conditions, 10 to 20 Years: (C-III, 60,000 pounds or greater)**

**P A R A M E T E R S :**

DENSITY ALTITUDE : 8000 MSL

GENERAL TYPE CODE : General

U.S CUSTOMARY UNITS : Speed in knots.....Lengths in Feet.....Weight in Pounds

|               |        |        |        |        |           |          |
|---------------|--------|--------|--------|--------|-----------|----------|
| Greater Than: | 120.00 | 78.00  | 0.00   | 0.00   | 60000.00  | 0.00     |
| & Less Than:  | 141.00 | 118.00 | 200.00 | 100.00 | 400000.00 | 10000.00 |

| Model                  | AppSpeed | WingSpan | AcLength | TailHite | ToWeight | RWindex |
|------------------------|----------|----------|----------|----------|----------|---------|
| Boeing 727-100 JT8D-7  | 125      | 108.00   | 133.17   | 34.25    | 140000   | 8950    |
| Boeing 727-100 JT8D-7  | 125      | 108.00   | 133.17   | 34.25    | 130000   | 7625    |
| Boeing 727-200 JT8D-7  | 138      | 108.00   | 153.17   | 34.92    | 140000   | 8775    |
| Boeing 737-200 JT8D-9  | 137      | 93.00    | 100.17   | 37.25    | 94000    | 9000    |
| DC-9-41                | 129      | 93.50    | 125.70   | 28.60    | 114000   | ----    |
| DC-9-11 JT8D-1         | 134      | 89.40    | 104.40   | 27.60    | 77750    | 7250    |
| DC-9-12 JT8D-1         | 134      | 89.40    | 104.40   | 27.60    | 79500    | 8350    |
| DC-9-13 JT8D-1         | 134      | 89.40    | 104.40   | 27.60    | 83750    | 9400    |
| DC-9-14 JT8D-1         | 134      | 89.40    | 104.40   | 27.60    | 85750    | 9950    |
| Lockheed L-188 Electra | 123      | 99.00    | 104.58   | 33.67    | 95000    | 5400    |

**C R I T I C A L   P A R A M E T E R S**

|                           |         |                          |
|---------------------------|---------|--------------------------|
| Runway Length Index.....( | 9950)   | DC-9-14 JT8D-1 @ 85750 # |
| WingSpan.....(            | 108.00) | Boeing 727-100 JT8D-7    |
| Tail Height.....(         | 37.25)  | Boeing 737-200 JT8D-9    |
| Aircraft Length.....(     | 153.17) | Boeing 727-200 JT8D-7    |
| Takeoff Weight.....(      | 140000) | Boeing 727-100 JT8D-7    |
| Approach Speed.....(      | 138)    | Boeing 727-200 JT8D-7    |

Source: ACDATA version 6.02